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Genes and personality characteristics: Possible association of the genetic background with intelligence and decision making in 830 Caucasian Greek subjects

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ABSTRACT

It is well known that intelligence consists of a variety of interactional and cognitive skills and abilities (e.g. tradecraft; critical and divergent thinking; perception of foreign information). Decision making is defined as the conscious choice between given options, relating to a problem. Both genetic background and environment comprise key elements for personality characteristics of the human being. The aim of this study is to determine the frequency distribution of rs324420, rs1800497, rs363050, rs6265, rs1328674 polymorphisms known to be involved in individual personality characteristics, in 830 Greek Subjects. The study is independent from direct clinical measurements (e.g. IQ measurements; physiological tests). The population of the volunteers is described, based on genotype, sex, with the respective gene frequencies, including the Minor Allele Frequency (MAF). A potential influence of the volunteer gender with the above characteristics (based on genotypes and alleles) is examined and finally, volunteers are classified as follows: A volunteer receives +1, for each genotype/allele, which enhances his intelligence or his decision-making. In contrast, he receives −1, for each genotype/allele, which relegates the individual characteristic. No statistically significant gender-characteristics correlation is observed. According to their genetic profile, a rate of 92.5%, of the volunteers may be characterized by prudence and temperance of thought, with

Abbreviations: MAF, Minor Allele Frequency; IQ, Intelligence Quotient; EQ, Emotional Quotient; *FAAH1*, Fatty-Acid Amide Hydrolase 1; *ANKK1*, Ankyrin Repeat and Kinase Associated Containing 1; *SNAP-25*, Synaptosomal-Associated Protein, 25 kDa; *BDNF*, Brain-Derived Neurotrophic Factor; *5-HT2A*, 5-Hydroxytryptamine Receptor 2A; SNAREs, Soluble N-ethylmaleimide-sensitive Factor Attachment Protein REceptors; GPCR, G Protein-Coupled Receptors; EMA, European Medicines Agency.

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only a small proportion of them (7.5%) may be classified as genetically spontaneous and adventurous. Regarding intelligence, the study population may lay around average and a little above it, at a rate of 96.3%, while the edges of the scale suggest only a 0.5% of the volunteers, who, although the "smartest", somehow seem to lack prudence. In conclusion, individuals with low cognitive ability may be more prudent than others and vice versa, while the "smartest" ones tend to be more risky, in decision-making. Therefore, intelligence and decision-making may, after all, be less linked to each other than expected.

Introduction

"Intelligence" is a systematically studied human characteristic. By the viewpoint of Psychology, intelligence consists of a series of interactional and cognitive skills and abilities, such as reasoning, critical and divergent thinking, planning, solving problems, comprehending complex ideas and learning, whether it is quick or experiential. Also intelligence is associated with the ability to observe, collect, and discern meaning from foreign actions; actors and activities.Such parameters determine the degree and structure of intelligence (Gottfredson, 1997) (Greene Sands and Haines, 2013). Today, we are able to estimate certain intellectual human abilities, as the reasonable thought (Intelligence Quotient—IQ) and the sentimental thought (Emotional Quotient-EQ) (Dulewicz and Higgs, 2000).

"Decision-making", is defined as a conscious choice (selection) between given options related to a problem. These can be either initially given or can be the results of cogitative processes, in which intelligence, as well as other characteristics (e.g. spontaneity) are involved. It is comprehensible that both logic and sentiment, along with other individual particularities, determine the pathway of any decision (Kondylis, 1982) (Tryfonas, 2008) (Kreek et al., 2005).

Objective of the present study is to describe the relation between the genetic profile (polymorphisms) and characteristics of personality. The approach of the genetic effect has to be under the prism of an individual, who, as an entity, interacts with his/her environment. Every person has a bidirectional relation with his/her environment, a fact that proposes there be also bidirectional influences. A similar interaction may take place between the gene and an individual. As a result, we assume that the environment might interact with the gene via the individual and vice versa.

A total of 5 polymorphic genes were investigated, including *FAAH1* (fatty-acid amide hydrolase 1), (UniProt: O00519), *ANKK1* (ankyrin repeat and kinase domain containing 1), (GeneCards: GC11P113258), *SNAP-25* (synaptosomal-associated protein, 25 kDa), (UniProt: P60880), *BDNF* (brain-derived neurotrophic factor), (NCBI: 627) and *5-HT2A* (5-hydroxytryptamine receptor 2A), (UniProt: P28223). All these genes are associated with several abilities. SNPs may be responsible and/or may lead to different intelligence and/or decision making.

FAAH1 (fatty-acid amide hydrolase 1)

The *FAAH1* gene encodes an enzyme-hydrolase that degrades a number of bioactive fatty-acid amides, among which are anandamide, oleamide and the endogenous cannabinoid, to their corresponding acids (UniProt: O00519). One of the *FAAH1* gene polymorphisms, registered as rs324420 and known as Pro129Thr, consists in the substitution of a Cytosine (C) (wild type allele), to an Adenine (A) (mutant Allele) (NCBI-dbSNP: 324420). The A allele is associated with an increase of memory (intelligence) (Mazzola et al., 2009) and simultaneously, addiction to substances (Flanagan et al., 2006). The latter is suspected to be a result of spontaneity and risky tendencies (decision-making) (Verdejo-García et al., 2008).

ANKK1 (ankyrin repeat and kinase domain containing 1)

The *ANKK1* gene encodes a protein that belongs to the Serotonin/Threonine protein kinase family, involved in signal transduction pathways. The studied polymorphism is located in exon 8 of *ANKK1* gene and is closely